Final Version

What is claim d is:

1. A method of axially aligning at least one pair of opposing optical fibers composed of bare optical fibers, optical fiber strands, unit cores or plural cores of optical fiber core wires, and tape shaped optical fiber core wires, the method comprising:

locating optical fiber guide sections, each having at least one guide groove to guide an optical fiber, on both sides of a butt alignment section having a pair of or plural pairs of butt alignment grooves separately formed apart from one another with a given distance in an opposing relationship on a substantially straight line;

shifting the optical fiber guide sections at the both sides upward above the butt alignment section and guiding the optical fibers in the guide grooves of the optical fiber guide sections at the both sides under a condition in that distal ends of the optical fibers protrude at least in length to reach the butt alignment grooves of the butt alignment section; and

lowering the optical fiber guide sections at the both sides to areas below the butt alignment section to allow the optical fibers to be received in the opposing butt alignment grooves of the butt alignment section and axially aligning the optical fibers with respect to one another.

2. The method of axially aligning optical fibers according to claim 1, wherein

the optical fiber guide sections are elevated from a lower position than the butt alignment section to a position higher than the same to guide the optical fibers in the guide grooves of the

optical guide sections; and

the optical fiber guide sections are lowered to allow the optical fibers to be received in the opposing butt alignment grooves of the butt alignment section, respectively, for axial alignment.

3. The method of axially aligning optical fibers according to claim 1, wherein

before the optical fibers are placed on the optical fiber guide sections, sheaths of ends of the optical fibers are removed to be bared to allow the ends of the optical fibers to be received in the guide grooves of the optical fiber guide sections and the butt alignment grooves of the butt alignment section.

4. The method of axially aligning optical fibers according to claim 1, further comprising:

before step of placing the optical fibers on the optical fiber guide sections, clamping the optical fibers on optical fiber holder sections mounted at the both sides of the optical fiber guide sections.

5. The method of axially aligning optical fibers according to claim 1, wherein the optical fiber guide sections are located at positions on substantially the same extension lines connecting at least one pair of the butt alignment grooves formed on the butt alignment section.

6. The method of axially aligning optical fibers according to claim 1, wherein

the guide groove has an opening portion that is wider than the butt alignment groove of the butt alignment section.

7. The method of axially aligning optical fibers according to claim 1, wherein

plural pieces of the optical guide sections are located on the both sides of the butt alignment section, respectively, and spaced apart from the same with a given distance.

8. The method of axially aligning optical fibers according to claim 1, further comprising:

during the step of axially aligning, detecting an alignment status of the optical fiber on the butt alignment grooves with image pick up means such that, when the optical fibers are out of axial alignment, automatically elevating the optical guide section to a position higher than the butt alignment section again to allow the optical fibers to be guided in the guide grooves of the optical fiber guide sections; and lowering the optical fiber guide section to allow the optical fibers to be received in the opposing butt alignment grooves of the butt alignment section, respectively, to be aligned.

9. An optical fiber axial alignment device for axially aligning at least one pair of opposing optical fibers composed of bare optical fibers, optical fiber strands, unit cores or plural cores of optical fiber core wires, and tape shaped optical fiber core wires, the optical fiber axial alignment device comprising:

a butt alignment section having at least one pair of butt alignment grooves formed apart from one another with a given distance in an opposing relationship on a substantially straight line; and

optical fiber guide sections, each having at least one pair of guide grooves, and disposed on both sides of the butt alignment

section to be moveable in a vertical direction.

10. The optical fiber axial alignment device according to claim 9, further comprising:

optical fiber holder sections, for holding at least one pair of the optical fibers, located on both sides of the optical fiber guide sections.

11. The optical fiber axial alignment device according to claim 9, wherein

the optical fiber guide section comprises at least one guide groove placed on substantially the same extension line that connects at least one pair of the butt alignment grooves formed on the butt alignment section.

12. The optical fiber axial alignment device according to claim 9, wherein

the guide groove has an opening portion that is wider than the butt alignment groove of the butt alignment section.

13. The optical fiber axial alignment device according to claim 9, wherein

plural pieces of the optical fiber guide sections are located on the both sides of the butt alignment section and separated from the same with given distances, respectively.

14. The optical fiber axial alignment device according to claim 9, further comprising:

image pick up means for detecting an aligned status of the optical fibers on the butt alignment grooves to produce a picture signal.

15. A method of mutually fusion splicing at least one pair of opposing optical fibers composed of bare optical fibers, optical fiber strands, unit cores or plural cores of optical fiber core wires, and tape shaped optical fiber core wires, the method comprising:

locating optical fiber guide sections, each having at least one guide groove, on both sides of a butt alignment section that has at least one pair of butt alignment grooves formed on a substantially straight line in an opposing relationship and separated from one another with a given distance;

guiding the optical fibers, under a condition wherein the optical fibers are located above the butt alignment section, so as to allow ends of bared portions, in which sheaths of the optical fibers are removed, of the optical fibers to protrude in the guide grooves of the optical guide sections at least in lengths to permit the ends of the bared portions to reach the butt alignment grooves of the butt alignment section;

lowering the optical fiber sections to positions below the butt alignment section to allow bared portions of the optical fibers to be received in the opposing butt alignment grooves of the butt alignment section, respectively, and axially aligning the bared portions with respect to one another; and

fusion splicing the opposing optical fibers with respect to one another.

16. The method of mutually fusion splicing the optical fibers according to claim 15, wherein

the optical fiber guide sections are elevated from a lower position than the butt alignment section to a higher position than

the same, and the bared portions, in which the sheaths of the optical fibers are removed, of the optical fibers are guided in the guide grooves of the optical guide sections; and

the optical fiber guide sections are lowered to allow the bared portions of the optical fibers to be received in the opposing butt alignment grooves of the butt alignment section, respectively, and axially aligning the bared portions with respect to one another.

17. The method of mutually fusion splicing the optical fibers according to claim 15, wherein

the optical fibers are clamped by optical fiber holder sections located on both sides of the optical fiber guide sections.

18. The method of mutually fusion splicing the optical fibers according to claim 15, further comprising

during the step of axially aligning, detecting an aligned status of the optical fiber on the butt alignment grooves with image pick up means and, when the optical fibers are out of the axial alignments, automatically elevating the optical fiber guide section to a position higher than the butt alignment section again to allow the optical fibers to be guided in the guide grooves of the optical guide section; and

lowering the optical fiber guide section to allow the optical fibers to be received in the opposing butt alignment grooves of the butt alignment section, respectively, to be axially aligned.

19. An optical fiber fusion splicing device for mutually fusion splicing at least one pair of opposing optical fibers composed of bare optical fibers, optical fiber strands, unit cores or plural cores of optical fiber core wires, and tape shaped optical fiber

core wires, the optical fiber axial alignment device comprising:

a butt alignment section having at least one pair of butt alignment grooves formed apart from one another with a given distance in an opposing relationship on a substantially straight line; and

optical fiber guide sections, each having at least one guide groove, and located on both sides of the butt alignment section to be moveable in a vertical direction.

20. The optical fiber fusion splicing device according to claim 19, further comprising:

at least one pair of optical fiber holder sections, for holding the optical fibers, located on both sides of the optical fiber guide sections.

21. The optical fiber fusion splicing device according to claim 19, wherein

the optical fiber guide section comprises at least one guide groove placed on substantially the same extension line that connects the at least one pair of opposing butt alignment grooves formed on the butt alignment section.

22. The optical fiber fusion splicing device according to claim 19, wherein

the guide groove has an opening portion that is wider than the butt alignment groove of the butt alignment section.

23. The optical fiber fusion splicing device according to claim 19, wherein

plural pieces of the optical fiber guide sections are located on the both sides of the butt alignment section to be apart from

the same with given distances, respectively.

24. The optical fiber fusion splicing device according to claim 19, further comprising:

image pick up means for detecting an aligned status of the optical fibers on the butt alignment grooves to produce a picture signal.